

Eucalyptus leucoxylon subsp. *bellarinensis* Bellarine Yellow-gum

Taxonomy

Eucalyptus leucoxylon subsp. *bellarinensis* Rule

This taxon is distinguished from *E. leucoxylon* subsp. *pruinosa* and subsp. *connata* by the stocking of rough bark, strongly beaked operculum, and larger fruits.

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 1998).

Categorised as Endangered in the 2014 Advisory list of rare or threatened flora (DEPI 2014).

Proposed conservation status

Critically Endangered in Australia

Criteria A2abce+3bce+4abce

Species Information

Description and Life History

The taxon is a tree to 12 m high, usually with a basal stocking of persistent rough bark. Surface wax present on juvenile leaves. Juvenile leaves to 9 cm long, 8 cm wide, connate for numerous pairs; adult leaves to 16 cm long, 3 cm wide; buds globular, sometimes lightly waxy; operculum strongly beaked. Flowers white; ovules in 4 vertical rows. Fruit to 1 cm long, 1.3(-1.4) cm diam.; valves 5-7; pedicel longer than fruit. The Bellarine Yellow Gum is a small malleelike, multi-trunked tree to 12 m high. The bark is box-like in appearance on the base and lower trunk, light brown to grey brown, fibrous and persistent. The bark on the upper trunk is smooth, mottled white and grey. Juvenile leaves are frequently connate, opposite and sessile, broadly ovate, blue-grey in colour and waxy. Cream flowers occur from April to May and large hemispherical fruits are borne on markedly long pedicels. The globular buds often have prominently beaked opercula (VicFlora 2016).

The Bellarine Yellow Gum is considered a long-lived tree. This taxon is winter flowering and it provides an important source of nectar during this period when little else is flowering. Pollination vectors are unknown, although pollination is thought to involve insects and nectarivorous birds. Seed dispersal is passive and wind-aided, and seed fall is greatest downwind of the parent tree and is likely to be dispersed one to three tree heights away. Like many other eucalypts it is likely to have fluctuations in annual seed production and thus heavy seed fall may be infrequent. Climatic factors such as water availability and temperature fluctuations are thought to influence seed production (DSE 2003).

Generation Length

The generation length of *Eucalyptus leucoxylon* subsp. *bellarinensis* is inferred to be 100 to 200 years (midpoint 120 years). This is based on a longevity that is plausibly in the 150-300 year range, and the capacity of the taxon to resprout repeatedly following fire and other disturbances (Carr and White 2001).

Distribution

The Bellarine Peninsula supports the only known locations of this taxon, and the sites occur in coastal regions close to Bass Strait. The main populations occur in the vicinity of Ocean Grove and Torquay with scattered



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occurrences in Wallington and Jan Juc (VicFlora 2016; DSE 2003), with a small remnant population at the western end of the nearby Lake Connewarre (Rule 1998). The original extent and situation in the landscape is poorly known, however the taxon's distribution appears to be adjacent to areas of the related floristic communities Coastal Moonah woodland and *Allocasuarina* woodland, with some overlap occurring. Bellarine Yellow Gum can be dominant or co-dominant with other Eucalypt species in grassy woodland habitat (DSE 2003).

Habitat

The taxon occurs in dry coastal habitats and is hence influenced by environmental attributes such as coastal winds. It occurs in the Grassy Woodland Ecological Vegetation Class that currently occupies 2% of its former range. The understorey structure of this grassy woodland would have consisted of a sparsely distributed shrub layer with a ground layer dominated by tussock grasses and herbaceous taxa. All sites are often blasted by cool, salt-laden winds and its preferred soils are heavy clay that are waterlogged in winter (DSE 2003; Rule 1998). This taxon has been observed in association with various Eucalypts including *E. viminalis*, *E. ovata* and *E. camaldulensis*, as well as *Allocasuarina* taxa (DSE 2003).

Threats

Key threats to the taxon include death of senescent trees, recruitment failure, reduced seed production, and implied loss of the genetic diversity. It is subject to continuing incremental habitat loss and degradation through weed invasion, surfactant pollution, and stock grazing and trampling.

Most occurrences of the taxon are of scattered mature individuals on the outskirts of developing townships, where clearing for residential development, infrastructure and agricultural activities have left remnants on roadsides, small nature reserves and farms. Most remnants are not reserved and are threatened by residential development (DSE 2003).

The taxon's recruitment is insufficient to adequately replace senescence of mature trees. In the Surf Coast Shire, for example, 86% of sites are without regeneration. The lack of suitable microsites for germination may be due to inappropriate disturbance regimes, weed invasion, stock grazing, or soil compaction. There are suggestions that mature trees are not producing abundant viable seed, which, if proven, may have implications for maintenance of genetic diversity within this taxon.

Existing mature plants are suffering from defoliation and dieback, the causes of which are unknown, however the abundance of Noisy Miners (with the consequent effects perhaps including modifying insect populations and depleting populations of insectivorous birds) and the degraded nature of the tree's habitats through weed invasion, surfactant pollution, stock grazing, and trampling, may be contributing factors. This taxon is declining in area, extent, and quality of habitat, and in the number of sub-populations and mature individuals. Populations are highly fragmented and population sizes are often small, hence genetic diversity and therefore seed viability are of concern. The frequent planting of specimen trees of *E. leucoxylon* (almost invariably not subspecies *bellarinensis*) on roadsides and in private and public gardens on the Bellarine Peninsula has led to hybridisation between subspecies. Swamping of the relatively small gene pool of the taxon is therefore a major threat (DSE 2003).

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IUCN Criteria

Criterion A. Population size reduction. Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			
	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3, A4	≥ 80%	≥ 50%	≥ 30%

<p>A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.</p> <p>A2 Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.</p> <p>A3 Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [(a) cannot be used for A3]</p> <p>A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.</p>	<p>based on any of the following:</p>	<p>(a) direct observation [except A3]</p> <p>(b) an index of abundance appropriate to the taxon</p> <p>(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat</p> <p>(d) actual or potential levels of exploitation</p> <p>(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites</p>
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Evidence:

Eligible under Criterion A2 as Critically Endangered

The population reduction over the past 300 to 600 years is estimated to be 90 to 98% (midpoint 95%), based on (a), (b), (c) and (e) above.

Past decline is based on estimates from Carr and White (2001), specifically, very extensive historic habitat loss to agriculture and urbanisation across the range of the taxon.

The causes of the reduction may not have ceased, be understood or be reversible.

Eligible under Criterion A3 as Critically Endangered

The population reduction over the next 100 years is projected to be 95 to 99% (midpoint 98%), based on (b), (c) and (e) above.

Future decline is based on estimates from Carr and White (2001) and the key identified threats for the taxon, including death of senescent trees, recruitment failure, reduced seed production, and implied loss of the genetic diversity. The taxon is subject to continuing incremental habitat loss and degradation through weed invasion, surfactant pollution, stock grazing and trampling, and there has been a suspected decline in seed viability and documented gene pool swamping by exotic Eucalypts including other subspecies of *E. leucoxylon*. Most extant occurrences comprise of scattered mature individuals on the outskirts of expanding residential developments on roadsides and in farmland.

Eligible under Criterion A4 as Critically Endangered

The population reduction over any 300 to 600 year period, including both past and future (up to 100 years in the future), is inferred to be 95 to 99% (midpoint 98%), based on (a), (b), (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

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Criterion B. Geographic range in the form of either B1 (extent of occurrence) and/or B2 (area of occupancy)			
	Critically Endangered Very restricted	Endangered Restricted	Vulnerable Limited
B1. Extent of occurrence (EOO)	< 100 km ²	< 5,000 km ²	< 20,000 km ²
B2. Area of occupancy (AOO)	< 10 km ²	< 500 km ²	< 2,000 km ²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			

Evidence:

Eligible under Criterion B as Endangered

The Extent of Occurrence (EoO) is estimated to be 411 km², and the Area of Occupancy (AoO) is estimated to be 152 km², based on accepted, post-1970 records in the Victorian Biodiversity Atlas (VBA).

The taxon is estimated to be severely fragmented, has 1 location, and has a continuing decline in (i), (ii), (iii), (iv) and (v) above.

Criterion C. Small Population size and decline				
		Critically Endangered	Endangered	Vulnerable
Number of mature individuals		< 250	< 2,500	< 10,000
AND at least one of <u>C1</u> or <u>C2</u>				
<u>C1</u>	An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
<u>C2</u>	An observed, estimated, projected or inferred continuing decline AND least 1 of the following 3 conditions:			
(a)	(i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
	(ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b) Extreme fluctuations in the number of mature individuals				

Evidence:

Eligible under Criterion C as Vulnerable

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It is estimated that there are 3,500 to 8,500 (midpoint 6,500) mature individuals, based on estimates from Carr and White (2001).

There is estimated to be a continuing decline of 95 to 99% (midpoint 98%) within three generations.

Criterion D - Very small or restricted populations			
	Critically Endangered	Endangered	Vulnerable
Number of mature individuals (observed or estimated)	<50	<250	<1,000
D2 - Only applies to the VU category Restricted area of occupancy or number of locations with a plausible future threat that could drive the species to critically endangered or Extinct in a very short time.	-	-	D2 - Typically: AoO < 20 km ² or number of locations ≤ 5

Evidence:

Eligible under criterion D as Vulnerable

The taxon is estimated to be very restricted.

Criterion E (Quantitative Analysis) was not addressed as the taxon does not have a detailed Population Viability Analysis.

References

Carr, G.W. and White, M. (2001). IUCN Status Review pro forma - *Eucalyptus leucoxylon* subsp. *bellarinensis* K. Rule.

DEPI (2014). *Advisory list of rare or threatened plants in Victoria - 2014*. Department of Environment and Primary Industries, Melbourne.

DSE (2003). Action Statement - Bellarine Yellow Gum *Eucalyptus leucoxylon* subsp. *bellarinensis* (No. 180). Department of Sustainability, Melbourne. Retrieved from:

https://www.environment.vic.gov.au/__data/assets/pdf_file/0019/32572/Bellarine_Yellow_Gum_Eucalyptus_leucoxylon_subsp._bellarinensis.pdf

Rule, K. (1998). A New, Rare Victorian Subspecies of *Eucalyptus leucoxylon* F. Muell. *Muelleria*, 11, 133-136.

SAC (1998). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Nomination No. 435 *Eucalyptus leucoxylon* subsp. *bellarinensis*.

VicFlora (2016). Flora of Victoria, Royal Botanic Gardens Victoria: *Eucalyptus leucoxylon* subsp. *bellarinensis*. Retrieved from: <https://vicflora.rbg.vic.gov.au/flora/taxon/2f28f4eb-9c96-4cfd-8b5c-c6f43d24076e>